TITLE OF THE INVENTION

A REFRIGERATOR HAVING STORAGE CHAMBERS WITH IMPROVED AIRTIGHTNESS

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of Korean Application No. 2003-19478, filed March 28, 2003, in the Korean Intellectual Property Office, the disclosure of which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0002] The present invention relates generally to a refrigerator, and more particularly to a refrigerator in which the structure of magnets, which are disposed in both a door and a body to maintain airtightness of a storage chamber, respectively, is improved.

2. Description of the Related Art

[0003] Generally, a refrigerator is an apparatus that provides cold air generated in an evaporator to a storage chamber to maintain various foods in a fresh condition. The storage chamber is selectively opened and closed by a door, and an airtight device is generally provided between a refrigerator body and the door to maintain airtightness of the storage chamber when the door is closed.

[0004] An airtight device may be exemplified by a gasket that is arranged along a circumferential edge of the inside surface of the door containing a magnet. The gasket causes the storage chamber to be airtight as the magnet contained in the gasket adheres to the front of the steel refrigerator body when the door is closed. Where a body of a refrigerator is made of a non-magnetic substance, such as synthetic resin, like a refrigerator disclosed in Korean Unexamined Pat. Pub. No. 2001-0113245, a magnetic substance, such as a steel plate, or magnet is embedded inside a front of the refrigerator body to allow the magnet contained in the gasket arranged on the door to adhere to the refrigerator body.

[0005] However, in the refrigerator having a front made of resin, the magnetic substance or magnet is embedded in the front of the refrigerator body, but the front of the refrigerator body made of resin is interposed between the magnet contained in the gasket and the magnetic

substance or magnet embedded in the refrigerator body . Thus, an attractive force between the magnet and the magnetic substance or magnet is weak . Therefore, it is difficult to maintain the airtightness of the storage chamber. There is a scheme in which the width of the magnet contained in the gasket or the magnetic substance or magnet embedded inside the front of the refrigerator body is widened to overcome the problem of the weak attractive force. However, this scheme causes difficulty in the manufacture of the refrigerator and incurs excessive manufacturing costs.

[0006] Furthermore, when a magnet is embedded inside the front of the refrigerator body, the magnet must be embedded at a correct position corresponding to that of the magnet contained in the gasket. When a foam insulating material is injected into the refrigerator body during the manufacture of the refrigerator, the magnet may be pushed by the pressure of the foam insulating material and removed from an initial correct position . Some amount of repulsive force may be generated between the magnet embedded inside the front of the refrigerator body and the magnet contained in the gasket, so poor airtightness of the storage chamber may result.

SUMMARY OF THE INVENTION

[0007] Accordingly, it is an aspect of the present invention to provide a refrigerator having an increased attractive force between a door-side magnet and a body-side magnet without increasing the sizes of the two magnets . A further aspect of this invention provides an attractive force even though the two magnets are offset from each other, thus preventing poor airtightness of the storage chamber.

[0008] Additional aspects and advantages of the invention will be set forth in part in the description which follows and, in part, will be obvious from the description, or may be learned by practice of the invention.

[0009] The foregoing and/or other aspects of the present invention are achieved by providing a refrigerator, including a door attached to a body which selectively opens and closes a storage chamber, a gasket along an inside surface of the door to maintain airtightness of the storage chamber, a first magnet in the gasket, a second magnet inside a front of the body facing the first magnet, and at least one shield member blocking surfaces of at least one of the first and second magnets not facing a remaining magnet.

[0010] In an embodiment of the invention, the shield member may be a metallic plate surrounding the remaining surfaces of the one magnet not facing the remaining magnet.

[0011] In an embodiment of the invention, the shield member blocks surfaces of the second magnet.

[0012] In an embodiment of the invention, the shield member blocks the north pole of the one magnet.

[0013] In an embodiment of the invention, the front of the body may be a non-magnetic substance.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] These and/or other aspects and advantages of the invention will become apparent and more readily appreciated from the following description of the preferred embodiments, taken in conjunction with the accompanying drawings of which:

FIG. 1 is a perspective view showing an appearance of a refrigerator, according to the present invention;

FIG. 2 is a cross section of the refrigerator of FIG. 1;

FIG. 3 is a detailed view of a portion of FIG. 2;

FIG. 4 is a sectional view of an airtight device of the refrigerator according to one embodiment of the present invention, showing an arrangement of magnets;

FIG. 5 is a view showing lines of magnetic force formed around a second magnet of the refrigerator of the present invention;

FIG. 6 is a view showing lines of magnetic force formed around a general magnet;

FIG. 7 is a sectional view of an airtight device of the refrigerator with the second magnet offset from an appropriate position;

FIG. 8 is a sectional view of an airtight device of the refrigerator according to another embodiment of the present invention with a shield member attached to a first magnet; and

FIG. 9 is a sectional view of an airtight device of the refrigerator according to another embodiment of the present invention with shield members attached to the first and second magnets.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0015] Reference will now be made in detail to the present preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to like elements throughout. The embodiments are described below in order to explain the present invention by referring to the figures.

[0016] As illustrated in FIGS. 1 and 2, a refrigerator of the present invention is constructed so that a storage chamber defined inside a body 10 of the refrigerator is divided by a central partition 11 into a freezer compartment 12 on the left and a refrigerator compartment 13 on the right. Further, a freezer compartment door 14 and a refrigerator compartment door 15 are situated in front of the freezer compartment 12 and in front of the refrigerator compartment 13, respectively. Both the freezer compartment door 14 and the refrigerator compartment door may occupy open 1 and closed 2 positions.

[0017] Gaskets 20 are arranged along circumferential edges of inside surfaces of the doors 14 and 15, which are used to selectively open and close the freezer compartment 12 and the refrigerator compartment 13, respectively, to maintain airtightness of the freezer compartment 12 and the refrigerator compartment 13.

[0018] A front 16 of the body 10 that comes into contact with the gaskets 20 is integrated with two inner casings 17 into a single body through a resin forming process. This construction of the front 16 of the body 10 provides the front 16 of the body 10 with a pleasant appearance and reduces manufacturing costs by allowing the two inner casings 17 of the freezer compartment 12 and the refrigerator compartment 13 to be integrally fabricated.

[0019] An airtight device 30 provided on the gaskets 20 and the front 16 of the body 10, as illustrated in FIGS. 3 and 4, includes first magnets 31 contained in the gaskets 20 and second magnets 32 embedded inside the front 16 of the body 10 to face the first magnets 31, respectively. The first magnets 31 are arranged to face the second magnets 32, with opposite poles thereof facing each other . This creates an attractive force between the first and second magnets 31 and 32 (see FIG. 4). The construction takes into account the fact that the front 16 of the body 10 is made of resin that is a non-magnetic substance. In this case, the airtightness of the freezer compartment 12 and the refrigerator compartment 13 is maintained by an attractive force between the first magnet 31 contained in the gaskets 20 and the magnets 32 embedded in the front 16 of the body 10.

[0020] A shield member 33 is attached to each of the second magnets 32 embedded in the front 16 of the body 10 so that side surfaces and a rear surface of the second magnet 32 are covered to enhance the attractive force between the first and second magnets 31 and 32. A front surface of the second magnet 32 facing each of the first magnets 31 is uncovered. The shield member 33 is formed of a metallic plate made of a magnetic substance, and is positioned in tight contact with inside surfaces of the second magnet 32 to surround the three surfaces of the second magnet 32. This construction, as depicted in FIG. 5, causes lines of magnetic force extending from a north pole to a south pole of the second magnet 32 to be blocked by the shield member 33 and be prevented from leaking through the inside surfaces of the magnet 32 . Therefore, the flux density of the lines of magnetic force is increased in an area between the first and second magnets 31 and 32, thus increasing the attractive force between the first and second magnets 31 and 32.

[0021] The effect obtained by the shield member 33 can be easily appreciated by comparing lines of magnetic force around a magnet without the shield member 33 shown in FIG. 6 with lines of magnetic force around the second magnet 32 with the shield member 33 shown in FIG. 5. As shown in FIG. 6, in the case of the magnet without the shield member 33, the lines of magnetic force extending from a north pole to a south pole of the magnet are distributed around the magnet . Thus, the effective distance L of the magnetic force contributing to actual attractive force between the first and second magnets 31 and 32 is short.

[0022] In contrast, as shown in FIG. 5, in the case of the second magnet 32 with the shield member 33, the lines of magnetic force extending from a north pole to a south pole of the second magnet 32 are blocked by the shield member 33 and, therefore, most lines of the magnetic force are directed through the open front surface of the second magnet 32 . Thus, the effective distance L' of the magnetic force contributing to actual attractive force between the first and second magnets 31 and 32 is lengthened. That is, in the present invention, the effective distance L' of the magnetic force in a direction from the second magnet 32 to the first magnet 31 is increased and the attractive force between the first and second magnets 31 and 32 is increased thereby causing the gasket 20 to be brought into tight contact with the front 16 of the body 10 and, therefore, securely maintaining the airtightness of each of the compartments 12 and 13.

[0023] Further, as illustrated in FIG. 7, in accordance with an embodiment of the present invention, the present invention, even when the second magnet 32 positioned inside the front 16 of the body 10 is pushed by the foam insulating material formed in the body 10 and somewhat setoff from a position corresponding to that of the first magnet 31, repulsive force is not generated between the first and second magnets 31 and 32 and, therefore, the first and second magnets 31 and 32 effectively adhere to each other. This is because lines of magnetic force extending through both sides of the second magnet 32, which may contribute to the repulsive force, are blocked by the shield member 33 and accordingly do not affect the first magnet 31. As a consequence, the construction of the present invention can suppress a repulsive force between the first and second magnets 31 and 32 even though the second magnet 32 embedded in the body 10 is somewhat offset from an appropriate position thereof during the manufacture of the refrigerator, thus preventing poor airtightness of the compartment.

[0024] FIG. 8 is a sectional view showing a refrigerator according to another embodiment of the present invention, in which a shield member 34 is attached to inside surfaces of the first magnet 31. FIG. 9 is a sectional view showing a refrigerator according to another embodiment of the present invention, in which shield members 33 and 34 are attached to inside surfaces of the first magnet 31 and outside surfaces of the second magnet 32, respectively. The effects of these aforementioned refrigerators are similar to that of the refrigerator of the first embodiment.

[0025] As described above in detail, the refrigerator of the present invention can increase attractive force between the first and second magnets by the attachment of at least one shield member to at least one of the first and second magnets, so the refrigerator can maintain the secure airtightness of the compartment of the refrigerator.

[0026] Additionally, the refrigerator of the present invention can block remaining lines of magnetic force except for lines of magnetic force contributing to an attractive force between the two magnets, so proper attractive force can be maintained between the two magnets even though the magnets are offset from each other during the manufacture of the refrigerator, thus preventing poor airtightness of the refrigerator.

[0027] The present invention may also be understood as a method for increasing the attractive force between a door 14 and15 and a refrigerator body 10. The first and second steps comprise installing magnets 31 and 32 in the gasket 20 and the front 16 of the body 10. This

creates an attraction between the magnets 31 and 32 when the doors 14 and 15 are closed. A shield member 33 is provided to at least one of the magnets 31 and 32 along surfaces of the magnet not facing the other magnet

[0028] Although a few embodiments of the present invention have been shown and described, it would be appreciated by those skilled in the art that changes may be made in these embodiments without departing from the principles and spirit of the invention, the scope of which is defined in the claims and their equivalents. It is also understood that the advantages found in this invention have applications in technologies outside that which has been discussed above.